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| EXAMINER | |
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| CHOW, JEFFREY J | |
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/915,650 | NAVAB ET AL. | |
| | Examiner | Art Unit | |
| | Jeffrey J. Chow | 2628 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *14 June 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *46,48,50-54,56 and 58-62* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *46,48,50-54,56 and 58-62* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 January 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

***Response to Arguments***

Applicant's arguments with respect to claims 46, 48, 50 – 54, 56, and 58 – 60, filed 14 June 2007, have been fully considered but they are not persuasive.

Applicant's arguments with respect to claims 61 and 62, filed 14 June 2007, have been considered but are moot in view of the new ground(s) of rejection.

Applicant argues that Kato et al. ("Marker Tracking and HMD Calibration for a Video-based Augmented Reality Conferencing System", 20 October 1999) deals with 2D object and does not have a solution for dealing with 3D objects (page 9 and 10) and cites that Kato et al are working on adding support for shared 3D objects (page 9). In Figure 4, Kato discloses a head that appears to be 3D, that looks 3D, that is 3D shaped, conforms with 3D shadows, and is a 3D model of a head (Figure 4). Kato discloses, "while using this system [AR conferencing system], users can easily change the arrangement of Virtual Monitors, placing the virtual images of remote participants about them in the real world and they can collaboratively interact with 2D and 3D information using a Virtual Shared Whiteboard (page 2, column 1, lines 10 – 14) and Augmented Reality is used to overlay virtual objects onto the real world (page 1, column 2, lines 18 – 28). Kato also discloses a 3D image data model of a product in a pose corresponding to the pose of the whiteboard and ID cards (Figures 3 and 4, see also Section 4: Position and pose estimation of markers), which creates the desired visual perspective.

Applicant argues that Harrington (US 6,898,307) does not disclose creation of an augmented reality video in which a 3D image of an object is augmented into a video stream (pages 10 and 11). Harrington discloses, synthetic image comprises a moving illustration or three-dimensional objects (column 4, lines 45 and 46) being employed as reference items

(column 4, lines 43 and 44) onto a piece of paper (column 4, line 40) or other templates (column 4, line 44) that is sensed by a computer (column 4, line 39) wherein the computer interpret captured video frames (column 4, lines 39 and 40) and overlays the paper as seen by the user (column 4, lines 54 and 55) presented in the head mounted display (column 4, line 54) and overlay the application's image onto the paper (column 5, lines 35 and 36).

Applicant argues that Harrington does not create a three dimensional image data model of a product in a pose corresponding to the pose of the moving model plane (page 12). Harrington discloses the user could select as the application image a particular internet browser engine which, based upon the located orientation of the piece of paper, would be transformed to exactly match the detected orientation of the piece of paper so that the displayed image provides the illusion of the web page actually appearing on the blank piece of paper being held by the user and once the position of the paper page is determined, information can be used to correctly distort the application's image so it overlays the paper in the eyes of the user (column 5, lines 4 – 35).

Applicant argues that Rhoads et al. (US 7,050,603) putting watermarks in video signals does not teach encoding hyperlink information into the augmented reality video. Rhoads discloses watermark may carry information or programmatic action or link to external information or an action, such as retrieval and output of information stored elsewhere in a database, website, etc (column 4, lines 31 – 39) and watermark can be embedded immediately into a video object layer after a graphical model is rendered to the video object layer (column 4, lines 40 – 49). It would have been obvious to embed a link to a website into a video or into a video object layer.

Applicant argues that Harrington does not disclose an animated 3D object, but admits that Harrington does disclose displaying a 3D object in different poses to highlight different perspectives of the 3D object, but it would make less sense for Harrington to disclose an object that is animated, therefore not obvious (page 12). The claim language recites, "the three dimensional image data model is an animation" (claim 62). Rhoads is relied upon to teach animated 3D objects. Harrington augments 3D objects in the real world through a video.

The claim objection has been withdrawn due to applicant's amendment.

The 35 U.S.C. 101 rejections have been withdrawn due to applicant's amendments.

### *Claim Objections*

Claim 54 is objected to because there are two semi-colons in a row on line 15. Appropriate correction is required.

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 46, 52 – 54, and 60 are rejected under 35 U.S.C. 102(a) as being anticipated by Kato et al. ("Marker Tracking and HMD Calibration for a Video-based Augmented Reality Conferencing System", 20 October 1999).

Regarding independent claim 46, Kato discloses a 3D head in a back right corner of Figure 4 (Figure 4) and the resulting composite video image is displayed back to both eyes of the user (page 4, column 1, lines 16 and 17), which reads on the claimed editing a video stream to combine augmented virtual images with video data. Kato discloses an image with a whiteboard and ID cards that has markers (page 3, column 1, line 9 – column 2, line 4 and Figure 4), which reads on the claimed providing video data comprising images of a moving model plane having markers. Kato discloses calibrating the Head Mounted Display (HMD) and camera, and estimating an accurate position and pose of fiducial markers (page 4, column 2, lines 4 – 11), which reads on the claimed markers for calibrating a camera to track the motion of the model plane and the claimed determining a pose of the moving model plane according to the markers in the video data and calibration results. Kato discloses a 3D image data model of a product in a pose corresponding to the pose of the whiteboard and ID cards (Figures 3 and 4), which reads on the claimed creating a three dimensional image data model of a product in a pose corresponding to the pose of the moving model plane. Kato discloses the six markers are used to find the board orientation and align virtual images (page 6, column 1, line 6 – column 2, line 5), which reads on the claimed orientation of the markers determines the orientation of the three dimensional image data model. Kato discloses a transformation of the relationship between marker coordinates and camera coordinates (page 4, column 2, line 12 – page 6, column 1, line 3) and the results of the virtual images (Figures 3 and 4), which reads on the claimed determining an image

correspondence between the camera calibration results associated with the moving model plane and the three dimensional image data model. Kato discloses the final result of the 3D virtual objects on the whiteboard and ID cards (Figures 3 and 4), which reads on the claimed rendering a 3D model of the product based on the image correspondence and the claimed generating an augmented reality video by superimposing the rendered 3D model of the product on the moving model plane in the video data and the claimed displaying the augmented reality video.

Regarding independent claim 54, claim 54 is similar in scope as to claim 46, thus the rejection for claim 46 hereinabove is applicable to claim 54.

Regarding dependent claims 52 and 60, Kato discloses a human manipulating an ID card (Figure 3), which reads on the claimed video data includes images of a human manipulating the pose of the model plane, wherein a rendering of the three-dimensional image model is manipulated according to the pose of the model plane.

Regarding dependent claim 53, Kato discloses the system uses computer vision techniques and have optimized algorithms for fast, accurate real time registration and convenient optical see-through HMD calibration (page, 2, column 1, lines 18 – 26), which reads on the claimed wherein the augmented reality video is produced in real time.

Claim 61 is rejected under 35 U.S.C. 102(e) as being anticipated by Harrington (US 6,898,307).

Regarding independent claim 62, Harrington discloses a camera 12 that captures the normal field of view of the user of the headset 10 that is substantially what the user would see without the headset 10 (column 4, lines 4 – 24) and the analog signal from the camera 12 is

converted to a digitized frame that can be stored in the computer 18 for analysis (column 4, lines 25 – 38) and the computer 18 must interpret the captured video frames to locate a piece of paper within the camera view (column 4, lines 38 – 67 and column 5, lines 1 - 34) and the preselected movable real object comprises a reference panel such as a screen, tablet or piece of paper and the identifying includes recognizing a corner of the panel (claim 2), which reads on the claimed providing video data comprising images of a moving model plane having markers. It is inherent that a piece a paper, screen, or tablet is substantially rectangular, which reads on the claimed model plane is a substantially rectangular plane. Harrington discloses marker is a corner of the panel (claim 2) and a piece of paper can be identified by its white color against a darker background (column 4, line 55 – column 5, line 3), which reads on the claimed marker is a graphic disposed on an upper surface thereof. Harrington further discloses the unprojection module 82 that projects three-dimension object onto a two-dimensional viewing plane, where a two dimensional image results from the three dimensional object (column 7, lines 28 – 53). Harrington further discloses the unprojection step comprises the mathematical calculation comprising taking a two-dimensional image and determining what three-dimensional object could have created that two-dimensional image with respect to what the object can be and where it could have been positioned and the subject invention utilizes known dimensions with regard to the camera system and viewing plane, in combination with assumed characteristics of the piece of paper (column 7, lines 28 – 53), which reads on the claimed determining a pose of the moving model plane according to the markers in the video data, the pose highlighting a particular perspective of the moving model plane and the claimed determining an image correspondence between the moving model plane having markers and the three-dimensional image data model.

Harrington discloses the camera provide the computer with the same view that the user sees so that the synthetic image is displayed or superimpose in a manner for comfortable and convenient interaction between the real reference item within the field of view that the user may be holding and manipulating (column 4, lines 4 – 37), which reads on the claimed producing the augmented reality video by rendering the three-dimensional image data model of the product superimposed on the moving model plane in the video data. Harrington discloses the user could select as the application image a particular internet browser engine which, based upon the located orientation of the piece of paper, would be transformed to exactly match the detected orientation of the piece of paper so that the displayed image provides the illusion of the web page actually appearing on the blank piece of paper being held by the user and once the position of the paper page is determined, information can be used to correctly distort the application's image so it overlays the paper in the eyes of the user (column 5, lines 4 – 35) and the unprojection step comprises the mathematical calculation comprising taking a two-dimensional image and determining what three-dimensional object could have created that two-dimensional image with respect to what the object can be and where it could have been positioned and the subject invention utilizes known dimensions with regard to the camera system and viewing plane, in combination with assumed characteristics of the piece of paper (column 7, lines 28 – 53), which reads on the claimed rendering of the three-dimensional image data model has substantially the pose of the moving model plane and the claimed creating a three dimensional image model of a product in a pose corresponding to the pose of the moving model plane, wherein orientation of the markers determines the orientation of the three dimensional image data model and the claimed display the augmented reality video. Harrington discloses video capture hardware that converts the analog

signal from the camera into a digitized frame that can be stored in the computer and the hardware outpus a signal to the computer as a digitized and processible representation of what the user sees from the camera's field of view and the video generation hardware takes a bit map of pixel values from the computer and converts them into a television format that can be displayed on the headset and where the signal generated by the camera is different from the signal displayed on the headset by the addition of the computer-generated electronic image to thereby form a synthetic image as an augmented-reality display (column 4, lines 25 – 38), which reads on the claimed converting the augmented reality video into a streaming video format and the claimed streaming the augmented reality video having the streaming video format over a communications network to a computer for displaying the augmented reality video.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 48 and 56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kato et al. ("Marker Tracking and HMD Calibration for a Video-based Augmented Reality Conferencing System", 20 October 1999) in view of Harrington (US 6,898,307).

Regarding dependent claims 48 and 56, Kato did not expressly disclose scaling the three-dimensional image data model to the model plane according to the markers, though Kato does disclose simple transformation that could include scaling and also, transformations of the

relationship between marker coordinates and camera coordinates (page 4, column 2, line 12 – page 6, column 1, line 3) and the sizes of the virtual screens on two ID cards being of different sizes and positions (Figure 3). Harrington discloses the translation, rotation, scaling and perspective operations can be applied to the image using standard image processing methods, or specialized textual mapping hardware may be employed for improving processing speed (column 5, lines 26 – 35). It would have been obvious for one of ordinary skill in the art at the time of the invention to modify Kato's system to scale the three-dimensional virtual image according to the markers. One would be motivated to do so because simple known algebraic transformation in 3-D space helps improve processing speed and scaling the virtual images depending on the markers would prevent inaccurate and/or obscured virtual images.

Claim 62 is rejected under 35 U.S.C. 103(a) as being unpatentable over Harrington (US 6,898,307) in view of Rhoads et al. (US 7,050,603).

Regarding independent claim 62, Harrington discloses a camera 12 that captures the normal field of view of the user of the headset 10 that is substantially what the user would see without the headset 10 (column 4, lines 4 – 24) and the analog signal from the camera 12 is converted to a digitized frame that can be stored in the computer 18 for analysis (column 4, lines 25 – 38) and the computer 18 must interpret the captured video frames to locate a piece of paper within the camera view (column 4, lines 38 – 67 and column 5, lines 1 - 34) and the preselected movable real object comprises a reference panel such as a screen, tablet or piece of paper and the identifying includes recognizing a corner of the panel (claim 2), which reads on the claimed providing video data comprising images of a moving model plane having markers. It is inherent

that a piece a paper, screen, or tablet is substantially rectangular, which reads on the claimed model plane is a substantially rectangular plane. Harrington discloses marker is a corner of the panel (claim 2) and a piece of paper can be identified by its white color against a darker background (column 4, line 55 – column 5, line 3), which reads on the claimed marker is a graphic disposed on an upper surface thereof. Harrington further discloses the unprojection module 82 that projects three-dimension object onto a two-dimensional viewing plane, where a two dimensional image results from the three dimensional object (column 7, lines 28 – 53). Harrington did not expressly disclose the three-dimensional image data model is an animation. Rhoads discloses embedding watermark in an animated 3D graphical objects and the embedded object can be composited with a video stream to form a video program, such as a movie or television program and graphical objects that link to information or electronic commerce transactions can be added to a video product, such as a movie, when its converted from one format to another (column 18, lines 5 – 18). It would have been obvious for one of ordinary skill in the art at the time of the invention to modify Harrington's system by projecting 3D animated objects. One would be motivated to do so because 3D animated objects are used in many commonly used applications such as games (column 18, line 63 – column 19, line 5) or interactive shopping (column 20, lines 41 – 48) that provide users a more convincing virtual environment. Harrington further discloses the unprojection step comprises the mathematical calculation comprising taking a two-dimensional image and determining what three-dimensional object could have created that two-dimensional image with respect to what the object can be and where it could have been positioned and the subject invention utilizes known dimensions with regard to the camera system and viewing plane, in combination with assumed characteristics of

the piece of paper (column 7, lines 28 – 53), which reads on the claimed determining a pose of the moving model plane according to the markers in the video data, the pose highlighting a particular perspective of the moving model plane and the claimed determining an image correspondence between the moving model plane having markers and the three-dimensional image data model. Harrington discloses the camera provide the computer with the same view that the user sees so that the synthetic image is displayed or superimpose in a manner for comfortable and convenient interaction between the real reference item within the field of view that the user may be holding and manipulating (column 4, lines 4 – 37), which reads on the claimed producing the augmented reality video by rendering the three-dimensional image data model of the product superimposed on the moving model plane in the video data. Harrington discloses the user could select as the application image a particular internet browser engine which, based upon the located orientation of the piece of paper, would be transformed to exactly match the detected orientation of the piece of paper so that the displayed image provides the illusion of the web page actually appearing on the blank piece of paper being held by the user and once the position of the paper page is determined, information can be used to correctly distort the application's image so it overlays the paper in the eyes of the user (column 5, lines 4 – 35) and the unprojection step comprises the mathematical calculation comprising taking a two-dimensional image and determining what three-dimensional object could have created that two-dimensional image with respect to what the object can be and where it could have been positioned and the subject invention utilizes known dimensions with regard to the camera system and viewing plane, in combination with assumed characteristics of the piece of paper (column 7, lines 28 – 53), which reads on the claimed rendering of the three-dimensional image data model

has substantially the pose of the moving model plane and the claimed creating a three dimensional image model of a product in a pose corresponding to the pose of the moving model plane, wherein orientation of the markers determines the orientation of the three dimensional image data model and the claimed display the augmented reality video. Harrington discloses video capture hardware that converts the analog signal from the camera into a digitized frame that can be stored in the computer and the hardware outputs a signal to the computer as a digitized and processible representation of what the user sees from the camera's field of view and the video generation hardware takes a bit map of pixel values from the computer and converts them into a television format that can be displayed on the headset and where the signal generated by the camera is different from the signal displayed on the headset by the addition of the computer-generated electronic image to thereby form a synthetic image as an augmented-reality display (column 4, lines 25 – 38), which reads on the claimed converting the augmented reality video into a streaming video format and the claimed streaming the augmented reality video having the streaming video format over a communications network to a computer for displaying the augmented reality video. Harrington did not expressly discloses encoding hyperlink information into the augmented reality video and accessing information about the corresponding product by selecting the corresponding product in the rendered three-dimensional form from the augmented reality video. Rhoads discloses watermark may carry information or programmatic action or link to external information or an action, such as retrieval and output of information stored elsewhere in a database, website, etc (column 4, lines 31 – 39) and watermark can be embedded immediately into a video object layer after a graphical model is rendered to the video object layer (column 4, lines 40 – 49) and users selecting a video object, retrieving the

linked information or actions for the selected object and rendering them on its user interface (column 16, lines 16 – 38). It would have been obvious for one of ordinary skill in the art at the time of the invention to further modify Harrington's system by embedding hyperlink information into 3D rendered objects when selected. One would be motivated to do so because this gives users the convenience of retrieving extra information about the selected desired object from an external source upon request.

Claims 50, 51, 58, and 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kato et al. ("Marker Tracking and HMD Calibration for a Video-based Augmented Reality Conferencing System", 20 October 1999) in view of Rhoads et al. (US 7,050,603).

Regarding dependent claims 50, 51, 58, and 59, Kato did not expressly discloses encoding hyperlink information into the augmented reality video and accessing information about the corresponding product by selecting the corresponding product in the rendered three-dimensional form from the augmented reality video. Rhoads discloses watermark may carry information or programmatic action or link to external information or an action, such as retrieval and output of information stored elsewhere in a database, website, etc (column 4, lines 31 – 39) and watermark can be embedded immediately into a video object layer after a graphical model is rendered to the video object layer (column 4, lines 40 – 49) and users selecting a video object, retrieving the linked information or actions for the selected object and rendering them on its user interface (column 16, lines 16 – 38). It would have been obvious for one of ordinary skill in the art at the time of the invention to further modify Kato's system by embedding hyperlink information into 3D rendered objects when selected. One would be motivated to do so because

this gives users the convenience of retrieving extra information about the selected desired object from an external source upon request.

***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffrey J. Chow whose telephone number is (571)-272-8078. The examiner can normally be reached on Monday - Friday 10:00AM - 5:00PM (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ulka Chauhan can be reached on (571)-272-7782. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JJC

ULKA CHAUHAN
SUPERVISORY PATENT EXAMINER